MONTGOMERY WATSON

February 18, 1998

Mr. Michael Bellot, Project Manager
U.S. EPA, Region 5
77 West Jackson Boulevard
Chicago IL 60604-3590

Re: Natural Attenuation Study
Blackwell Forest Preserve Landfill
Du Page County, Illinois

Dear Mr. Bellot:

A natural attenuation study will be conducted at the Blackwell Forest Preserve Landfill site to evaluate the potential for intrinsic remediation (i.e., natural attenuation) to mitigate the organic contaminants of concern in groundwater in the south portion of the site. Available site data provide evidence that natural attenuation is occurring and reducing organic contaminant concentrations in downgradient groundwater. This letter summarizes relevant site background, provides a review of the current evidence for natural attenuation, and describes the planned study.

SITE BACKGROUND

A network of wells has been established at the Blackwell Forest Preserve site to monitor a surficial glacial outwash aquifer and a deeper bedrock aquifer (Figures 1 and 2). These wells have been used to monitor groundwater quality periodically over the past 15 years. Beneath and downgradient of the landfill, the two aquifers are separated by a silty clay till that is up to five feet thick.

Historic monitoring data collected since 1983 and the results for the first round of a two-year quarterly groundwater monitoring program conducted in November 1997 indicate that groundwater in the outwash aquifer has been affected by low levels of organic contaminants in an area south of the landfill. The approximate area affected by volatile organic compounds (VOCs) in the outwash aquifer in November 1997 is indicated on Figure 1. The configuration of this area is generally similar to 1992. VOCs that were detected in November 1997 in the monitoring wells within the affected area include trichloroethene (TCE), 1,2-dichloroethene, and 1,1-dichloroethane. In general, more VOC compounds and higher concentrations were reported in 1992. Additional compounds reported in 1992 included benzene, 1,2-dichloropropane, chloroethane, 1,1,1-trichloroethane (TCA), perchloroethene (PCE) and vinyl chloride.

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Four semi-volatile organic compounds (SVOCs), phenol, pyrene, bis(2-ethylhexyl)phthalate and di-n-octylphthalate, were reported in some of the samples collected in 1992 and November 1997. Phthalates were only detected in a few samples. Since these compounds are common field and laboratory artifacts and the occurrences do not correlate with the distributions of identified site-derived contaminants, these detections likely reflect field and/or laboratory contamination. Pyrene was only reported in one sample in 1992 at a low concentration of 1 µg/L; this detection was probably not representative of groundwater quality. Phenol was detected in many of the samples, particularly those from November 1997, these detections appear to be field artifacts.

Recently, a leachate collection system (LCS) was installed at the landfill to minimize the potential for leachate migration. This system removes leachate and a sample of leachate from the LCS was analyzed in December 1997. Analytical results show the presence of a generally different suite of VOCs when compared to downgradient groundwater. The VOCs detected in leachate include acetone, 2-butanone, chlorobenzene, cis-1,2-dichloroethene, 4-methyl-2-pentanone, benzene, ethylbenzene, toluene, xylenes, and TCE. It is possible that other VOCs are present but were not identified because detection levels are elevated due to the leachate matrix. Only two SVOCs, 3&4-methylphenol and phenol, were detected in leachate.

EVIDENCE FOR NATURAL ATTENUATION

Currently available site information indicates that natural attenuation is occurring in the upper aquifer. The principal evidence for natural attenuation includes:

- The extent of the affected area in the outwash aquifer has not changed significantly since 1992, so it is not expanding.

- The number and concentrations of VOCs in the affected area of the outwash aquifer have generally decreased since 1992, suggesting that the source has lower concentrations now than earlier.

- The differences in the suites of VOCs in leachate and downgradient groundwater suggest that some organic compounds are degrading. The VOCs detected in leachate are all potentially mobile in groundwater but many are not being transported downgradient from the landfill. It appears that the non-chlorinated VOCs (acetone, 2-butanone, 4-methyl-2-pentanone, ethylbenzene, toluene, xylenes and benzene) are being attenuated rapidly because they are not presently detected downgradient, even close to the landfill.

- Chlorinated VOCs that are being transported at low concentrations from the landfill also appear to be degrading in groundwater, just at a slower rate than the non-chlorinated compounds. Degradation is indicated not only by generally lower concentrations in 1997 compared to 1992 and the apparently non-expanding

configuration of the affected area during this five-year period, but also by the types of compounds identified. Most of the VOCs that have been detected in downgradient groundwater are typical degradation products of PCE, TCE and/or TCA solvents. For example, PCE and/or TCE commonly degrade via a sequence that may include 1,2-dichloroethene, vinyl chloride and/or chloroethane. The dominance of these typical degradation products as downgradient groundwater contaminants is strong evidence of active natural attenuation processes.

In summary, the available site data provide evidence that natural attenuation is occurring in the outwash aquifer downgradient of the landfill. Moreover, the natural attenuation processes should prevent migration of contaminants to potential receptors at levels of concern, particularly now that the LCS is in operation. The following plan outlines a systematic program of sampling to provide additional supporting evidence of natural attenuation at the Blackwell site.

NATURAL ATTENUATION STUDY

The study will include analyses of routinely collected groundwater samples for additional parameters, the collection and analysis of soil samples from the outwash aquifer, and predictive modeling. The sampling and analysis programs for groundwater and soil, and the planned scope of predictive modeling activities are described in the following sections.

Groundwater

Groundwater samples to support the natural attenuation study will be collected from selected wells as part of the routine quarterly monitoring program at the site. The selected wells represent locations upgradient, within, near the edge, and at the downgradient margin of the affected area in the outwash aquifer. The following table lists the selected wells and indicates their locations relative to the affected area.

WELLS TO BE SAMPLED FOR THE NATURAL ATTENUATION STUDY

Well Location Relative to Affected Area	Well Designation
Upgradient	G-130
Within	G-127
Edge	G-107S
Downgradient Margin	G-122

The groundwater samples collected from these wells during a routine quarterly sampling event at the site will be analyzed for additional parameters to support the natural attenuation study. Additional analytical parameters, which will be measured by the laboratory, are listed in the following table.

ADDITIONAL LABORATORY PARAMETERS FOR GROUNDWATER SAMPLES

Parameter	Analytical Method
Total Organic Carbon (TOC)	EPA 415.2
Biochemical Oxygen Demand (BOD)	PA 405.1
Nitrate-N	SM4500NO$_3$D

The analyses will be performed by First Environmental Laboratories, Inc., Naperville, Illinois. This laboratory is currently analyzing routine quarterly groundwater samples. Alkalinity will also be included as an additional field parameter. This parameter will be measured at the time of groundwater sampling.

Soil

Soil samples will be collected from within the outwash aquifer at three locations: within the affected area, at the downgradient edge of the affected area, and downgradient of the affected area. Specific sampling locations will be selected in the field based on the inferred position of the leading edge of the affected area and accessibility. Samples will be submitted to Keystone Laboratories, Newton, Iowa for analysis. U.S. EPA will be informed at least five days in advance of the collection of samples.

At each of the sampling locations, soil from approximately the same depth as the monitoring well screens in the outwash aquifer will be collected in a clean, one quart glass jar. If possible, the jar will be filled completely and sealed with minimum headspace. The glass jar will be maintained at a temperature of about 4°C during storage and transport to the laboratory for analysis.

Chemical, physical and microbiological analyses will be performed on the soil samples submitted to the off-site laboratory. Chemical parameters and analytical methods are listed in the following table.

CHEMICAL PARAMETERS FOR SOIL SAMPLES

Parameter	Analytical Method
Total Organic Carbon (TOC)	EPA 9060
Nitrate-N	SM4500NO$_3$D
Sulfate	EPA 200.7
pH	EPA 9045C

Physical analysis will measure Total Solids (EPA 160.3). Microbiological testing will include aerobic total heterotrophs (SM9215B), aerobic hydrocarbon degraders and acridine orange counts (method described by: Hobbie, J. E., Daley, R. J. and Jasper, S., 1977, Applied Environmental Microbiology, 33:1225-1228).

MODELING

Following data analysis and pre-modeling calculations, a conceptual model will be prepared. Once established, a solute transport model will be utilized to predict the future extent and concentration of the contaminant plume. The selected model will be capable of simultaneously simulating advection, dispersion, sorption, and biodegradation. Both a first-order-decay model and Bioplume III will be considered for this modeling task.

REPORTING

After the study is completed, a report will be prepared for U.S. EPA. The report will summarize the study methods, present the field and laboratory results and describe the predictive modeling performed. The report will also include an evaluation of the potential for natural attenuation to address contaminants in groundwater in the south part of the site.

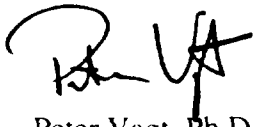
SCHEDULE

Collection of samples for additional analyses is planned to occur during the next round of routine quarterly groundwater sampling which is scheduled for late February 1998. Soil sampling and analysis are planned for March/April. Following receipt of laboratory results, data analysis and modeling will require approximately one month to complete. On the basis of this projected schedule, a report is expected to be submitted to U.S. EPA by July 3, 1998.

If you have questions or need more information on the natural attenuation study program, please contact me at (630) 691-5020.

Sincerely,

MONTGOMERY WATSON



Peter Vagt, Ph.D., CPG
Vice President

cc: Rick Lanham – Illinois Environmental Protection Agency
Jerry Hartwig – Forest Preserve District of DuPage County
Kostas Dovantzis – Tetra Tech EM, Inc.
Kurt Lindland, Assistant Regional Counsel – U.S. EPA

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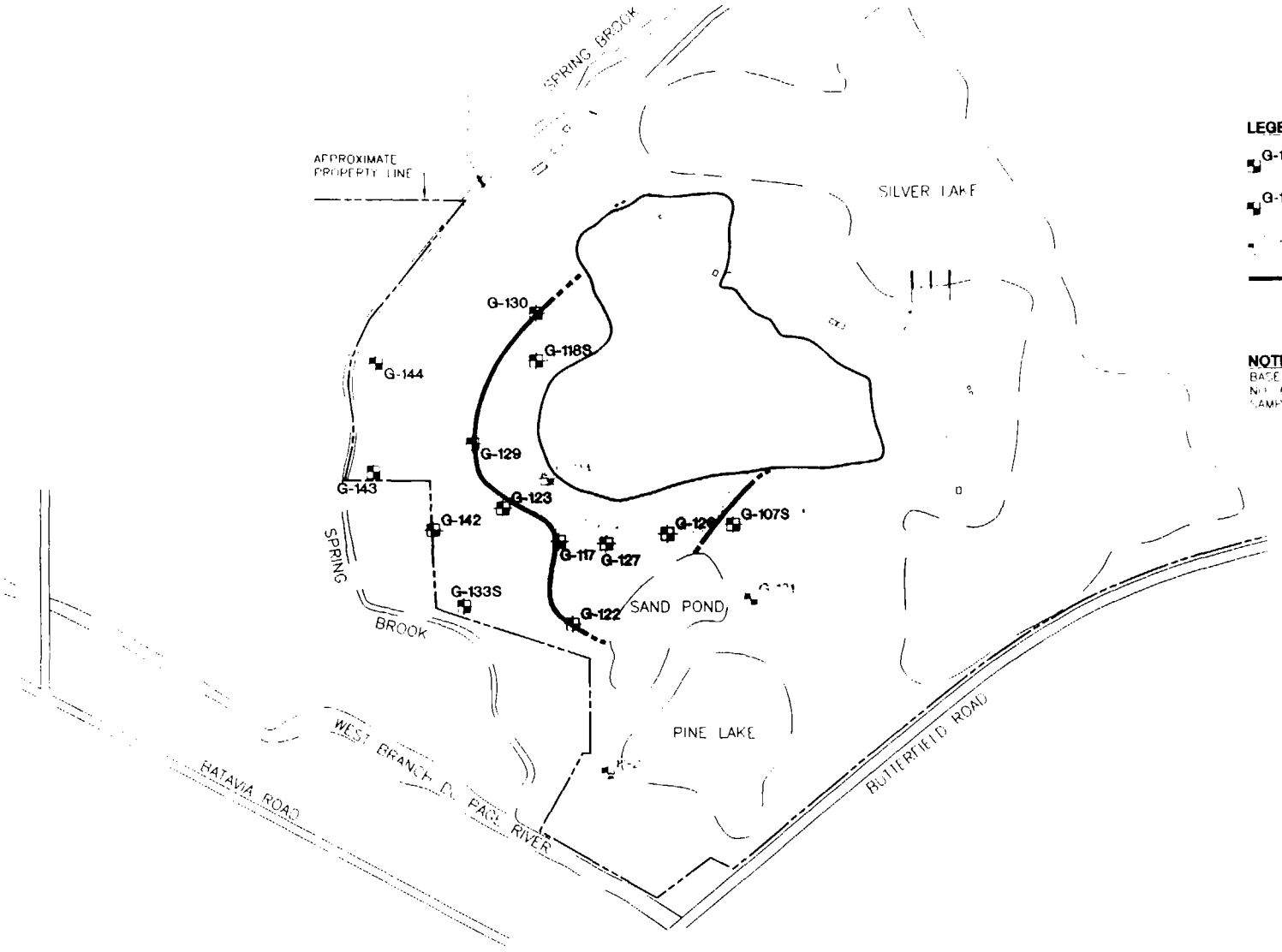

LEGEND

- G-126 SHALLOW DETECTION WELLS
- G-122 SHALLOW COMPLIANCE WELLS
- SHALLOW WATER LEVEL WELLS
- APPROXIMATE DOWN GRADIENT MARGIN OF AREA AFFECTED BY VOCs (NOVEMBER, 1997)

NOTE

BASE MAP DEVELOPED FROM WAPZIN INC. DRAWING NO. 607C100 B42, "GROUNDWATER MONITORING WELL SAMPLING LOCATION MAP," DATED [illegible]

north

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SCALE IN FEET

MONTGOMERY WATSON
Chicago, Illinois

FIGURE 1

UPPER AQUIFER WELL AND PIEZOMETER LOCATIONS

BLACKWELL LANDFILL NPL SITE
DU PAGE COUNTY, ILLINOIS

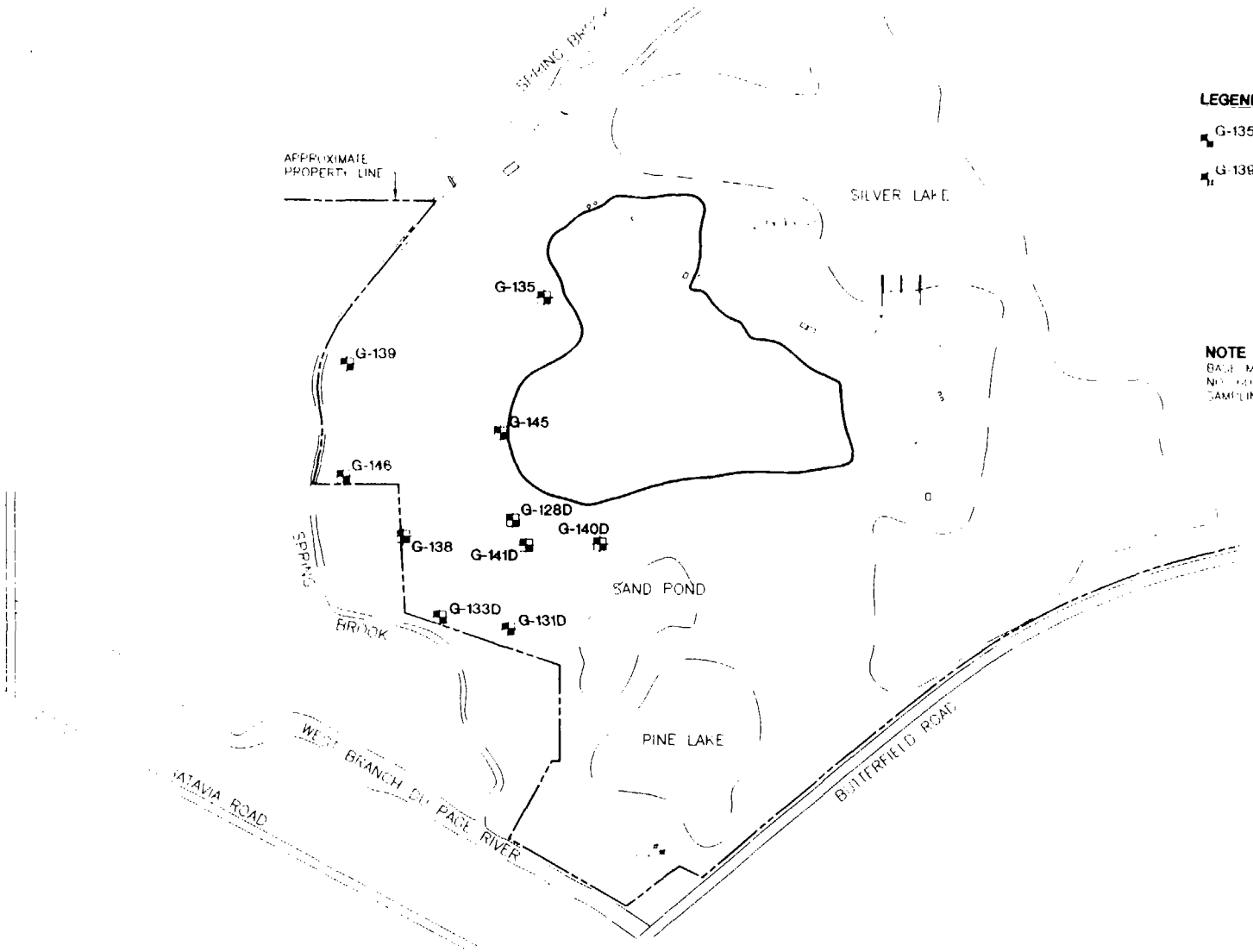

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FIGURE 2

BEDROCK AQUIFER WELL LOCATIONS

BLACKWELL LANDFILL NPL SITE
DU PAGE COUNTY, ILLINOIS